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Photosynthetic Response of Pepper to Application of Beneficial Microorganisms on Sandy Textured Soil

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Introduction

Since ancient times, *Piper nigrum*, also known as the "King of Spice" has always been one of the most widely traded agricultural products around the world. Pepper is used as an important component of many recipes and to flavor foods. Though the price tends to fluctuates in recent years, pepper remains one of the most sought-after commodities in the world. Even up till now, demand for pepper continues to exceed the market supply, both locally and globally. This is true with the world-renowned Sarawak creamy white pepper which is still a more preferred pepper brand especially in Japan. Because of this, Sarawak pepper can still fetch a higher price in the international market.

Introducing beneficial microorganisms in pepper planting through the Natural Farming approach will be part of an effort by the Malaysian Pepper Board that supports green development. This is in line with the National Commodity Policy heading towards an environment-friendly industry. Currently, some pepper farms in Sarawak can be found in areas with marginal soil conditions such as sandy textured soil. This particular soil type usually contributed to lower yield of pepper. As the Natural Farming approach is closely related to soil fertility, it is with hope that introducing several liquid fertilizers containing beneficial microorganisms to sandy textured soil type can help to improve the soil's chemical and physical properties.

Nevertheless, enhancing food security through this approach in Malaysia is still a not well-established option due to lack of technical documentation and knowledge in the required subject. The desired effects for applying beneficial or effective microorganism fertilizers to soils can vary, at least initially. Therefore, this study was conducted to compare selected properties of soil as well as certain *P. nigrum* photosynthetic responses after application with different Natural Farming liquid fertilizers.

Materials and Methods

Experimental plot

The study was conducted at Kampung Serayan Hilir, Lundu, Sematan, Sarawak, Malaysia with an area coordinate of 1.722322, 109.769786. The study plot was approximately 0.01 hectare. The soil series at the study site was Miri Series of the Miri Family which is a sandy, siliceous, isohyperthermic, strongly cemented Typic Haplorthods. Due to their sandy textures as well as very poor moisture and fertility status, soils of the Miri Series are not suitable for agriculture and are best left under their natural vegetation (Teng, 2004). The crop involved in this study was *Piper nigrum*. Duration of the study was from July 2015 to June 2016.

Experimental design and treatments

The experiment used a randomized complete block design (RCBD) with 5 treatments replicated 5 times giving a total of 25 plants. Treatments were: (i) F0 – control, (ii) F1 – Indigenous Microorganisms (IMO), (iii) F2 – Fermented Plant Juice (FPJ), (iv) F3 – Fermented Fruit Juice (FFJ),